Genetic Analysis of Lake Washington Chinook Salmon: how many stocks do we have?

Presented by
Bill Mavros (KCDNR) and
Anne Marshall (WDFW)

Genetic Questions

What is the stock status and genetic interrelationship of Lake Washington fall chinook?
Do these naturally spawning geographical groupings constitute genetically distinct populations?
Are they genetically similar to the Issaquah hatchery and the Green River hatchery stocks?

Study Design

investigate subpopulation structure among these populations using allozymes and microsatellite DNA markers
compare results from these two techniques
look at using non-intrusive DNA sampling (fin clip) of juveniles and the feasibility of using this data for stock structure analysis
develop a microsatellite DNA baseline for L. Washington fall chinook

Genetic Analysis of Lake Washington Chinook Salmon

Presented by:

Anne Marshall
Washington Dept of Fish & Wildlife

Type of Genetic Data Used

DNA ➡ **Proteins** ➡ **Enzymes**

- Biochemical products of enzymes are visualized on gels

Enzymes have. . .

Variability in structure; we call the different forms alleles

Frequency of particular variable forms or alleles can differ among populations

Allele frequency data are collected from:

Spawning aggregations of chinook salmon presumed to be reproductively isolated from other such groups

Samples of Lake Washington Chinook Populations

Location	Year	Number
Cedar River	1993, 94	24 + 83
Issaquah Hat.	1992	99
Bear/Cottage Lake Creeks	1998, 99	71 + 107
Issaquah Creek	1999	100

Notable results. . . .

Cedar River chinook appear somewhat differentiated from chinook in N. Lake Washington

Bear/Cottage chinook displayed some temporal variability

Notable results. . . .

Issaquah River and hatchery chinook were relatively similar

Genetic differentiation between Issaquah and Bear/Cottage chinook was relatively small

Issaquah and Bear/Cottage chinook have similar allele frequency profiles . . .

What can this tell us?

Within the Puget Sound Chinook ESU . . .

Chinook populations in Lake WA basin appear most closely related to South Puget Sound populations

Preliminary DNA Results

Microsats failed to reveal existence of multiple stocks in north L. Washington tribs
Naturally spawning north L. Washington stocks are genetically distinct from Green River hatchery stock
currently analyzing Cedar River juveniles and Issaquah hatchery juveniles

Where do we go from here?

- Analyze genetic data in conjunction with life history data to address questions regarding the genetic relationships of Lake Washington fall chinook salmon
- need to collect DNA data for more groupings and for more year classes in the L. Washington basin…long term monitoring
- need to map gene flow among spawning groups

Other data needs

life history data and population structure
evolutionary dynamics and history
present and past selective forces
stray rates and migration patterns
hatchery/wild interactions